Forecast 1954

1953

CHRISTMAS 1953

PUBLISHER'S PAGE

EVERY once in a while we notice in various publications, including the daily press, that certain groups and individuals alike become alarmed at the flood of new inventions and discoveries. They urge, in all seriousness, and with an almost pitiful insistence, that scientists and inventors should take a long holiday, anywhere from five to twenty years, during which time all scientific progress should cease. This curious and downright childish frame of mind would be laughable were the suggestion not often made by respected people in responsible positions.

The answer of course is that it isn't these well-meaning souls who do the pleading—*it's their pocketbooks*. Progress has always hurt the unimaginative who couldn't keep up with it. New processes, new inventions, new discoveries frequently *do* put older concerns out of their established lines of business, just as young people must succeed old and worn-out leaders.

But far from stopping progress, let those who think we have progressed entirely too fast take a deep breath. Up to now we have only crawled at a snail's pace—the next 25 years will be a veritable tornado compared to the last 100 years.

And never forget for an instant—man's greatest discoveries, his most fabulous inventions, still lie in the future.

Yet some misguided people would stop all this, forgetting that the Earth speeds along in its orbit at the rate of 66,600 miles an hour!

They might as well try to stop Christmas from coming around, or hold over the New Year for a few seasons—the poor wretches!

Fortunately, most of us do know that, in Galileo Galilei's words: "*Eppur si muove*," (the Earth *does* move) despite the unbelievers.

Imbued with this eternal truth, let me reassure you that the holidays will positively come around this season, and therefore, as I have for the past 45 years, let me shake your hand—by remote control—and send you my most sincere and heartfelt wishes for 1954, plus

A Most Joyous Christmas
And a Happy and Prosperous New Year

HUGO GERNSBACK

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25 West Broadway, New York

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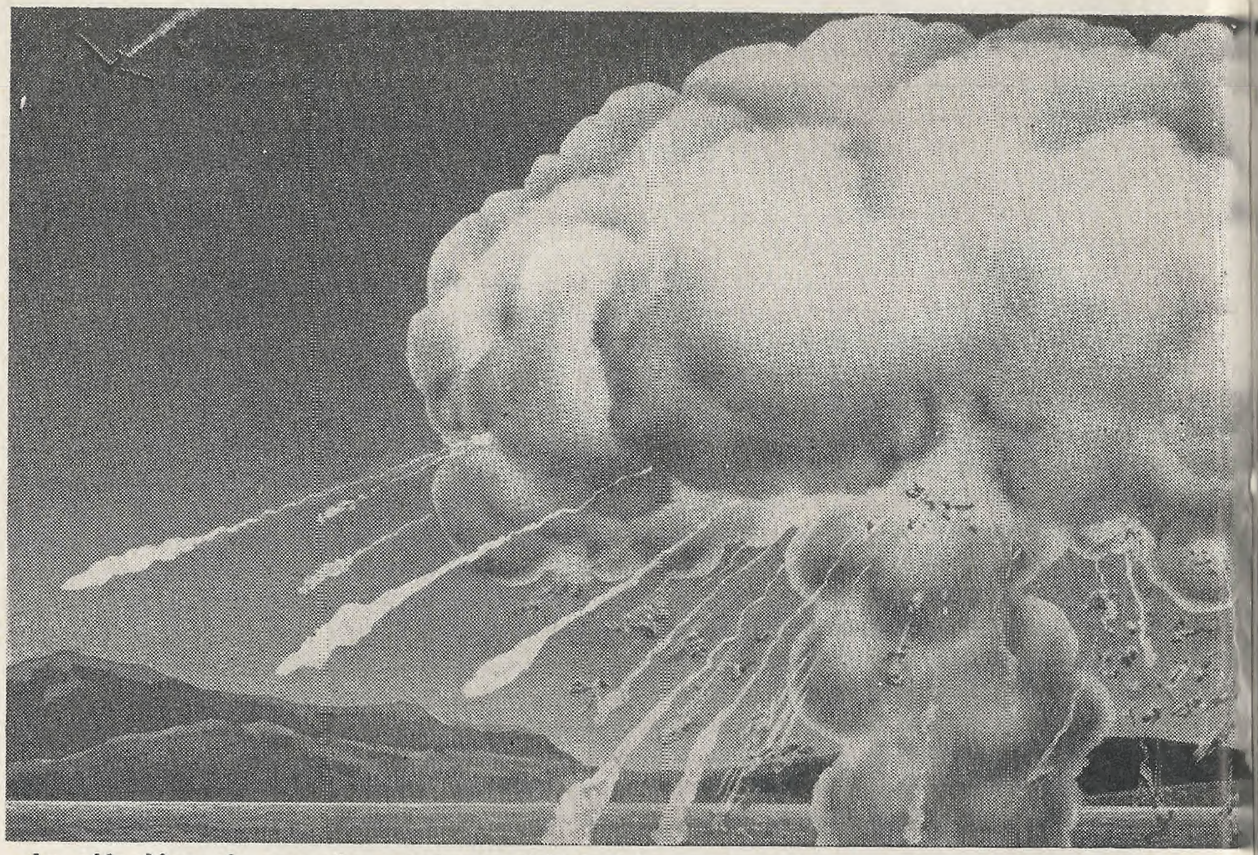
Art work by Frank Paul

The Christmas Tree's Secrets

A curious fact about Christmas trees is that so little is known about them. ● Do not look for enlightenment in the best encyclopedias, for you will not find it there. ● The average American Christmas tree is known as a Balsam Fir tree, botanically *abies balsamea*. ● In a more precise term, it is an evergreen tree of the genus *abies*. ● Exactly like other coniferous trees, it manufactures a balsam of the turpentine family, which man collects by wounding the tree's surface, causing the resin (Canada Balsam) to exude. ● This balsam permeates the entire tree, including its beautiful dark green needle-like leaves. ● It would not survive the intense cold—often 60° below zero in our extreme northern climates—nor live on the high mountains without this anti-freeze balsam. ● Many millions of years ago, the Fir trees, in their fight for survival in the cold zones, had to evolve the right chemical or perish. ● How the Fir and other resinous trees accomplish this is almost a complete puzzle to scientists—we understand the process only very vaguely. ● The mystery is all the greater because Fir and similar trees grow often in poor, sandy soil, devoid of high mineralization, so the tree obtains little of its complex chemical content directly from the soil. In looking for our answer, we run head-on into another unsolved puzzle. ● Trees, along with all other plants, owe their green color to chlorophyl—a green pigment which by the action of sunlight manufactures plant food from carbon dioxide and water. ● Yes, we know all about the chemistry of chlorophyl—*except how the plant does it!* ● To add to our ignorance, let us ask only a few pertinent questions. How does the tree build its cellular wood? ● How exactly does it pump huge quantities of sap through its millions of plant pipes, sometimes hundreds of feet above the soil? ● And exactly *how* and *where* is the anti-freeze balsam manufactured, which is then drawn into the tens of millions of microscopic tubes, including each and every single needle-leaf? ● Many hundreds of similar questions could be asked, without benefit of an exact answer. ● And that's why scientists are humble in the presence of a Christmas Tree—they respect the tree for its many unrevealed secrets and the happiness it bestows on man. . . .

HUGO GERNSBACK

Atomic DEFENSE

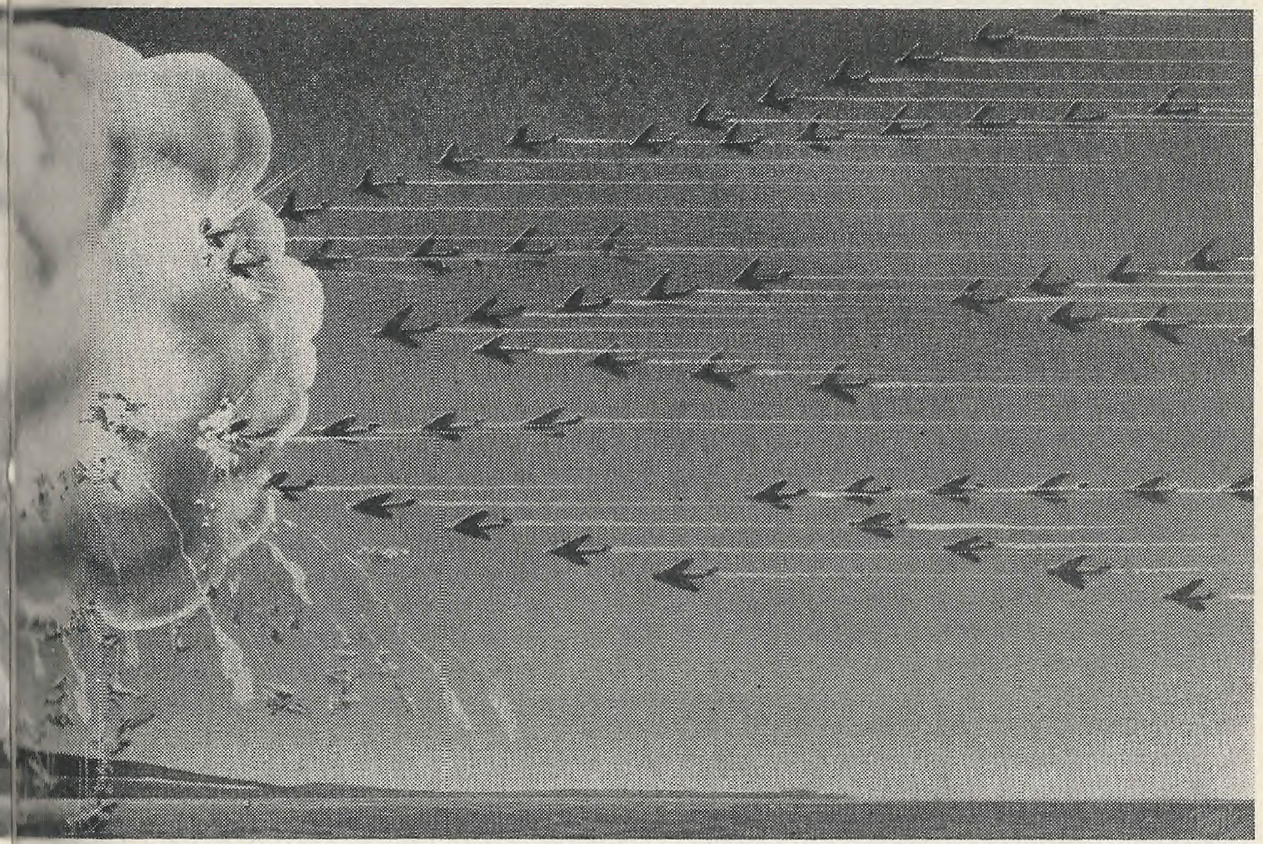


An attacking air armada can be annihilated by means of a counter-attacking atomic bomb. Attack is made by a single defending atom carrier plane high above the invader.

FOR a long time, ever since 1945, we have thought of A-bombs only as weapons of mass annihilation — to destroy enemy cities and heavy industrial plants and to inflict similar large scale destruction.

That atomic bombs — A and H (hydrogen) types—could be used for purely defensive purposes, may sound strange but the idea no longer is as far-fetched as it may sound.

Modern war—that is to say, total war—has changed many old concepts. No longer is war waged solely between armies in the field. As World War II has demonstrated, when war comes nowadays, *everyone* is in it, civilians as well as the military. When large metropolitan centers are attacked by A- or H-bombs, far more civilians are in the war than are military personnel. Moreover, the stakes involved are infinitely



Atomic bomb bursts 1000 ft. above invaders, spreading rapidly. It envelops the bombers who cannot escape fast enough. Similar atomic strikes can annihilate entire armada.

larger than they ever were before. When you compare the eight million lives of a city like New York or London, plus the cost of tens of billions of property and treasure losses, the price of the expended atomic bomb shrinks into less than insignificance.

● Admittedly. the cost of a modern A-bomb or H-bomb is high. No nation can afford to waste even a single one. *But, as you can fight fire with fire, so it is also possible today to fight A-bombs with A-bombs, H-bombs with H-bombs.* Let me elucidate. In the case of the U.S., an atomic attack is most likely to be made on us in two ways—either by airplanes or by submarines, or by both together, acting as a task force.

Now, if we have a fairly airtight alert system, such as the present, yet unfinished Radar

"D.E.W." (Distant Early Warning), our Air Force can take adequate measures so that an enemy bombing fleet will not overwhelm us, as happened at Pearl Harbor. Yet the unpleasant fact remains that in every air attack at least 30% of the attacking planes will get through nowadays, according to our best-informed military experts. Thus, if a force of 300 enemy planes were to attack us, *90 would get to the target, despite our best present-day modern defense measures.*

● The reason for this is simple. Attacking enemy bombing fleets must fly in a more or less tight formation, for as soon as they disperse, the individual planes become easy prey for the defending fighter planes, which can pick them off readily. When flying in a tight formation, the invading planes rely on their *combined* fire power and raise havoc with the defending fighter planes.

On the other hand, we must consider that the enemy's 300-plane armada will not carry 300 atom bombs. Certainly not more than 10% of the planes—probably less, i.e., 30 planes at the most—will have A- or H-bombs. It is quite possible that the other enemy planes which do not carry A-bombs can and probably will have stowed in their holds other high-explosive bombs—"blockbusters," incendiary bombs, etc.

If, as the experts tell us, 90 out of 300 enemy planes get through, 9 of these will carry A-bombs or H-bombs. And we all know that it takes only a single H-bomb to wipe out New York or Chicago.

● What can we do about this? Fortunately, we have more atomic bombs than any nation at present, and this is how they can be best used in case of an attack: *Our best defense is to attack any invading enemy fleet with atomic bombs.* As the enemy must fly in a tight formation, *we attack the fleet from above,* out of range of his guns. By means of simplified electronic computers on board our defending planes, and by using our new atomic artillery, it will not be difficult to explode an H-bomb 1,000 feet or more *above* the oncoming enemy armada. The ensuing atomic explosion will envelop and volatilize the entire enemy fleet, provided our bomb is placed and exploded accurately. Not only will the ensuing heat and radiation destroy the invaders, but, as an atomic cloud rapidly spreads over a considerable area, most planes will be destroyed. Even those on the fringe area still will suffer from the powerful radiation and searing heat. In case part of the fleet should escape, further A-bombs can be dropped on the already crippled air armada.

● It should further be realized that when the first strike is made on the attacking fleet, a chain reaction will probably set in, instantly exploding all the atom bombs as well as other bombs carried by the enemy, thereby intensifying the annihilation.

Let us add too that our counterattacking atomic artillery-carrying planes will try hard not to launch A-bombs against the invading enemy plane formation while the latter flies over densely inhabited centers. If our D.E.W. radar systems work properly we will counterattack in the high north or over the ocean where atomic explosions do little or no harm.

● It is even possible to use atomic weapons against submarines in special cases. We know that there is a strong possibility that any submarines nearing our coasts must be suspected of carrying A- or H-bombs, to be delivered via a small airplane stowed away on the submarine. Some modern submarines are large enough to carry more than one plane.

As submarines often hunt in packs, it is the Navy's business to locate them while they are still traveling toward our shores. The U.S. Navy nowadays is sufficiently well equipped with electronic instrumentation and other means to locate enemy submarines. In case of an enemy underwater pack, a certain method of annihilation is to drop an H-bomb amid the pack *and explode it under water.* Even submarines a fair distance away from the center of such an explosion will be crushed by the titanic detonation. We know today that the first thermonuclear (H-bomb) underwater explosion at Bikini blew away the entire island where the explosion took place.

Escaping single submarines will be dealt with and hunted in the usual manner. If one of the attacking submarines succeeds in

(*Continued on page* 31)

TO OUR READERS

FORECAST 1954—as its many other predecessors—is an annual Christmas Card of publisher HUGO GERNSBACK. Over 5,000 copies have been printed for the publisher's friends in and out of the radio, electronic and television industry. Please do not send money for extra copies—the booklet is NOT for sale. Requests for single copies of FORECAST 1954 can be filled only as long as the present supply lasts. Quantity orders cannot be accommodated.

MOST THINGS Just AREN'T SO!

When man has discovered all the secrets of life and mind and explored all the Universe, then will he realize his never-ending dearth of knowledge.

THE above is a paraphrase of a philosopher's opinion of modern man,* but contrived to be perhaps more apropos for the purpose of this discussion.

Terrestrial man is a most extraordinary creature in that *he thinks,* yet he only dimly comprehends his true status amid his surroundings. He is a colossal giant compared to other living microcreatures such as bacteria. Now compare him with the *smallest* thing we know — the electron (there may be smaller things to become known), and he becomes a huge galaxial entity.

Yet his individual size compared to the Universe is so incomprehensibly small that it defies all figures and mathematics.

The fact that makes man even more unique is that he is placed mid-way between the infinitesimally small and the incredibly large, in the Universe.

These truths now restrain man from completely exploring his entire surroundings in a physical sense, for apparently he is hopelessly out of touch with the physical world.

● *His senses play him false, because his sensory organs do not truly interpret the signals.*

Let me try to elucidate. Run your fingers over the cheek of a pretty girl. Your brain telegraphs to your consciousness (we know little or nothing about the mechanics of this) that her skin is *extraordinarily smooth!* An absurd figment of our imagination.

*"When man has conquered all the depths of space, and all the mysteries of time, then will he be but still beginning."—H. G. Wells: *The Shape of Things to Come.*

"We still clumsily poke around in a thick broth with a probe relatively as coarse as the top of the Empire State Building."

The truth is that our sense of touch is so grossly coarse that *we cannot even sense or touch the skin proper.* If you magnified the tip of your finger and the girl's skin only a modest 10,000 times (the electron microscope magnifies four hundred thousand times), you would find a thick layer of huge coarse rocks—the girl's powder and make-up. Underneath this is another thick blanket of oil and perspiration. The rocks are pierced by huge telegraph-like

poles at regular intervals — the girl's fine downy-hair. Under the rocks and oil, there are large circular pits—the pores. Steaming acrid masses of liquid are welling up from the pits—fatty oil and perspiration.

Your fingertip has an even coarser make-up. It has deep canyons, filled with gummy oil, perspiration, accumulated dirt, and a thick film of air—as has the girl's cheek. These two layers of air alone make it practically impossible for the two surfaces—the girl's cheek and your fingertip—to actually contact in a mechanical sense. *They will always be separated by the air films,* even if you succeeded in partly eliminating with chemicals the powder, oil, perspiration, dirt, etc. I could write a good-sized book on this particular subject without covering much ground, but the few facts cited must suffice.

● A smooth skin? *About as smooth as the tops of the Swiss Alps!* Shall we take a *better* look at the girl's skin at a one hundred million magnification? It would be a shocking, unearthly view and would not have the most remote resemblance to the skin you think you know. Yet even a one hundred million magnification would *not* give you the true and final picture. You have to do much better—you need many billion times more magnification until you finally see the *ultimate* constitution of the girl's skin—*matter in its true state*—i.e. atoms encircled by electrons, which spin with dizzying speeds around the central nucleus. (All this is not meant to depreciate the fact that the cheek of a pretty girl is pleasant to our touch.)

Unfortunately, our extremely coarse sense of sight is as poor as our clumsy sense of touch. Mortal eyes will probably never directly see an atom nucleus, let alone an electron. *We are completely blind when it comes to the infinitely small.* The animal eye has not evolved to such a purpose. Moreover, all our other senses suffer from similar shortcomings.

But the electron—infinitesimal as it is to our shockingly gross senses, is not the end of the line. For when we try to further magnify and dissect the electron—which is still *matter*—it vanishes and becomes *energy*. Energy, our scientists will tell you, is simply another meaning for or concept of matter.

● Note that this is merely the 1954 model of matter. Every generation our concept of matter changes completely. It has done so for 10,000 years. Thinkers have always wondered what the *smallest* particle really is.

How matter will look 10,000 years hence, when we shall have a little more insight into our surroundings, better education, and more advanced instrumentation, is anyone's guess.

It is extremely difficult for us to realize how blind and helpless we are in respect to our actual environment, *which includes our own body*. Due to our inferior and wholly inadequate senses, we must forever use crutches—artificialities—to learn more of the real nature of things. Without these crutches we would remain sub-humans—animals. We started with the stone knife, the massive club, then fire—all primitive crutches, on our way up.

Today we have the microscope, the telescope, the electric current, electronics — myriads of instruments to make us see, hear, feel with greater acuity—to sharpen our dull senses more and more—*forever,* as long as the race shall persist.

● In his groping with the invisibly small, the monstrously large and remote, man so far has learned pitifully little. Despite his modern and better scientific crutches — his instruments and tools—his kind still perishes by the millions because he cannot even penetrate to his present invisible enemies: bacteria, viruses, cancer and other disease agents. We still clumsily poke around in a thick broth with a probe relatively as coarse as the top of the Empire State Building, when we should use a fine cambric needle to spear our miniscule enemies. Our best crutches are still woefully crude.

Now let us lift our heads and look at the stars. Here, too, things just aren't so. *We never actually see a star as it is NOW*. What we see in reality is the *light* of the star *as it was* anywhere from four years* to billions of years ago. The light is stale and hoary with age. And no matter how great a telescope we ever shall build, this will not change the condition.

Even our own local star, the Sun, can be seen only *as it was* over 8 minutes ago. It takes light this long to reach us from that body. And here again when we study its shining surface we realize that it is not a surface at all but the sun's atmosphere. Here the light rays, from the deep interior of the sun born by atomic action, break through, to shoot into interstellar space.

● Let's go back to the stars once more and look at "them" — or

**Alpha Centauri,* the nearest star aside from our Sun, is four light years away.

rather their light—any night. Let us assume that the average star is 100 million light years removed from Earth (further in reality). But in 100 million years, some stars have moved vast distances in every imaginable direction. *Hardly a single star is where it appears to be when you look at "it."*

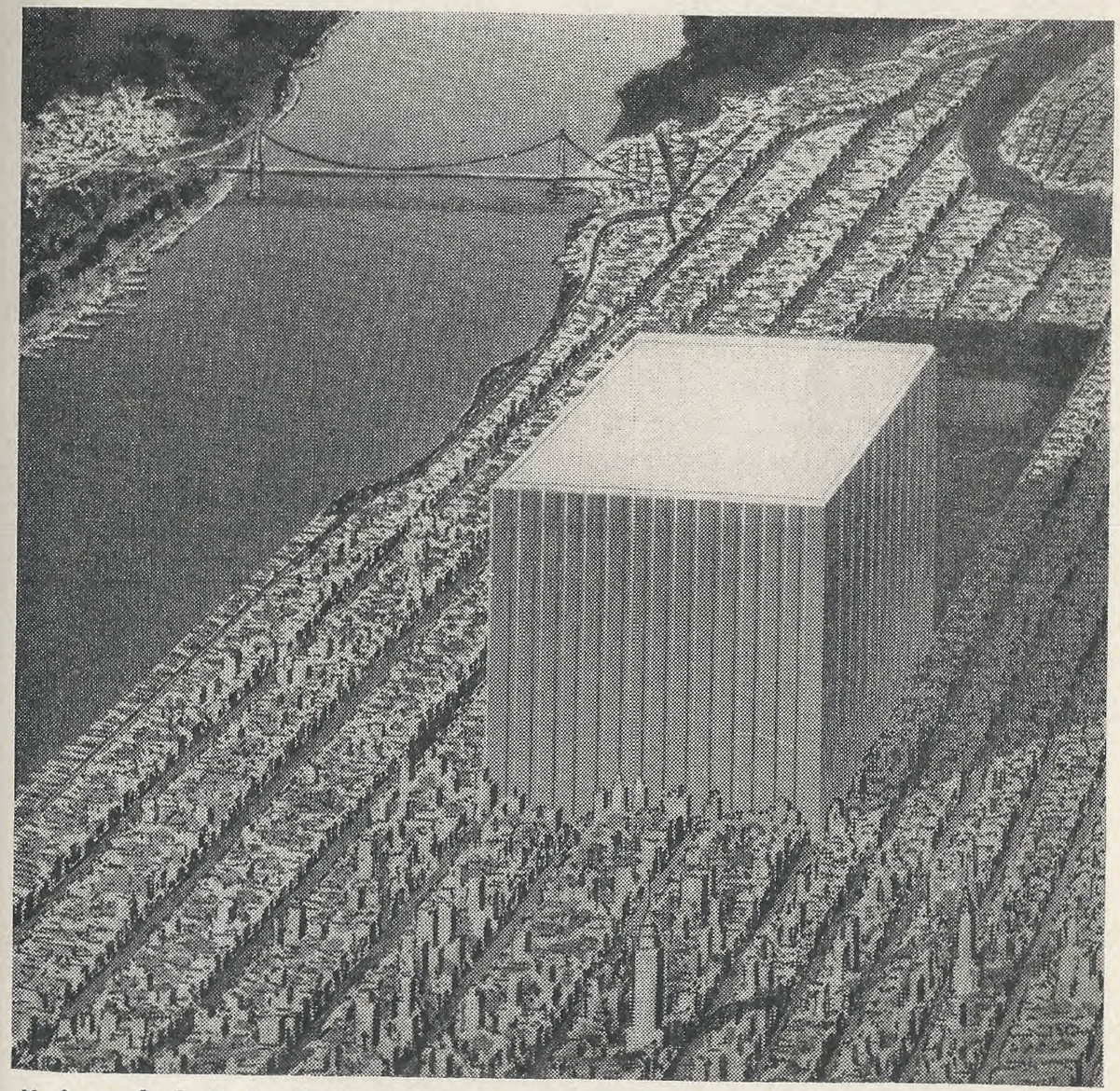
You merely look at a point *where it was* 100 million years ago—NOT NOW. Thousands of "stars" we gaze at today have exploded into *novae*—celestial atom bombs by the present time. But we shall not be the wiser for ages to come—till their light, bringing the news of the stellar cataclysmic fireworks, eventually reaches us. Not so many years ago we received such news, of a star that had exploded during the time of the Roman Empire, when Christ was still alive. The "message" took over 1,900 years in coming. What lesson, if any, do we draw from all this?

Just as the most intelligent dog could never comprehend the mechanics or working of a fine wrist-watch, even if he looked at it, pawed and smelled it all his life, so man can never completely comprehend all the laws of Nature and her total extent. The animal brain and its product, the MIND, are a distillation of evolutionary processes which will never be completed. This process will go on forever, as long as the race evolves—if it does not retrograde.

● The laws of Nature, on the other hand, are fixed and immutable. Man can never change a single one in the slightest degree. *There is no direct connection between man's intellect and Nature.* We flatter ourselves that there is, but obviously this is impossible. Like the dog, we will forever look at the "watch" (Nature) uncomprehendingly. The more we learn about it, the less we shall know, for the mind is limited in scope due to our imperfect senses. The more our knowledge increases, the more tools and instruments we require. But no matter how well we perfect them, they will still be crude and inadequate to help us unravel Nature's innermost secrets.

● Once man fully recognizes these eternal truths, he will then divest himself of his age long arrogance and embrace deep humility in all his future contemplations of Nature.

VANITY in humanity



It is a fact that all humanity alive today, numbering 2½ billion souls, could be comfortably stowed in a cube ½ mile wide, ½ mile long, and ½ mile high. Note Empire State building in foreground, Chrysler building to its far right.

THAT curious organism *Homo sapiens* (the human race, that can think) considers itself elected to conquer its native planet and in time the universe as well. In its vanity, no task seems impossible for it.

Yet, after thousands of years, the changes man has wrought on the face of our Earth are negligi-

ble today. From our nearest neighbor in space, the Moon, a pitifully small distance away (only 239,000 miles) none of our greatest heroic works can be seen unless an ultra-high-power telescope is used—the Pyramids, our great dams, our huge bridges, even our mightiest cities, become invisible.

A single thickness of tinfoil wrapped around a big orange compares roughly in proportion with the total height that in flight we have risen above the Earth (13.7 miles) and descended under its surface (scant 3 miles). Our planet, remember, measures about 8,000 miles in diameter.

● The proud human race today numbers 2,500,000,000 (2½ billion) people. We are the masters of the planet—at least we so proclaim, loudly and constantly. But at the first minuscule, purely *local* disturbance, such as a volcanic outburst, a hurricane, a blizzard, or an earthquake, hundreds, thousands of humans perish, like mites on a leaf at the first onset of frost. If the disturbance is extensive, such as a sizeable tidal inundation, or a large earthquake, tens of thousands may perish.

Of this mighty human race which boasts that it dominates the planet and asserts that it has conquered the world, millions have died under the onslaught of even more powerful forces—which proud humans can't even see with their naked eyes.

Bacteria, virus and similar micro-organisms which far outnumber the human race cause epidemics such as cholera, influenza, yellow fever, the bubonic plague and many others. These organisms number into the billion-billion-billion . . . they outnumber us quadrillion billions to one.

The great human race, which claims it populates the earth so densely, is actually of sparse numbers.

● The largest population of living organisms is perhaps the minute forms of aquatic life living mainly in the oceans, lakes, and rivers.*

The second place most likely is held by the micro-organisms which invade all forms of life larger than themselves.

In third place, numerically, we can probably place the insects. They are so numerous that no human can even begin to form an estimate of the total—it is wholly beyond human comprehension. The insects are our closest and most dangerous rivals for the possession of the Earth. Most entomologists think that in time the insects will be the real and final masters of the planet. Even today, if the insects would stop fighting among themselves, they could in a single season denude all living plant life from our planet. Most of us would then starve for lack of food. Surviving would be only those who had access to the oceans and lakes to live on fish for food.

In fourth place we can place fish and other aquatic life.

In fifth place we find the teeming aerial life—the birds. The birds outnumber the humans probably over 100,000 to 1.

● In the sixth and last place we find the mammals, of which the human race is but a small part, even though we number 2½ billion.

Still, we are a lot of people, you will say. True, but mere numbers do not always convey a clear picture. So in imagination let us transport the world's entire human population and relocate them in one area. You might think that bringing together all humanity existing today would take up a huge amount of space—at least as large as a big state. Such is man's vanity.

The surprising and revealing fact is that the entire human race—numbering 2,500,000,000 people according to the latest figures—can be nicely accommodated in a comparatively modest space, measuring ½ mile long, ½ mile wide, and ½ mile high. The 2½ billion humans will fit well into such a cube, with *room to spare.* We allot each man, woman, and child a space 6 feet high by 1 foot square, or 6 cubic feet per person. Naturally the world's population couldn't roam around in such a limited space, but nevertheless there would be room in which to stand them.

● The ½-mile cube itself could be readily constructed of steel and concrete—no technical difficulties in doing so today. And we can build it right in New York's Central Park. (See illustration for better visualization.)

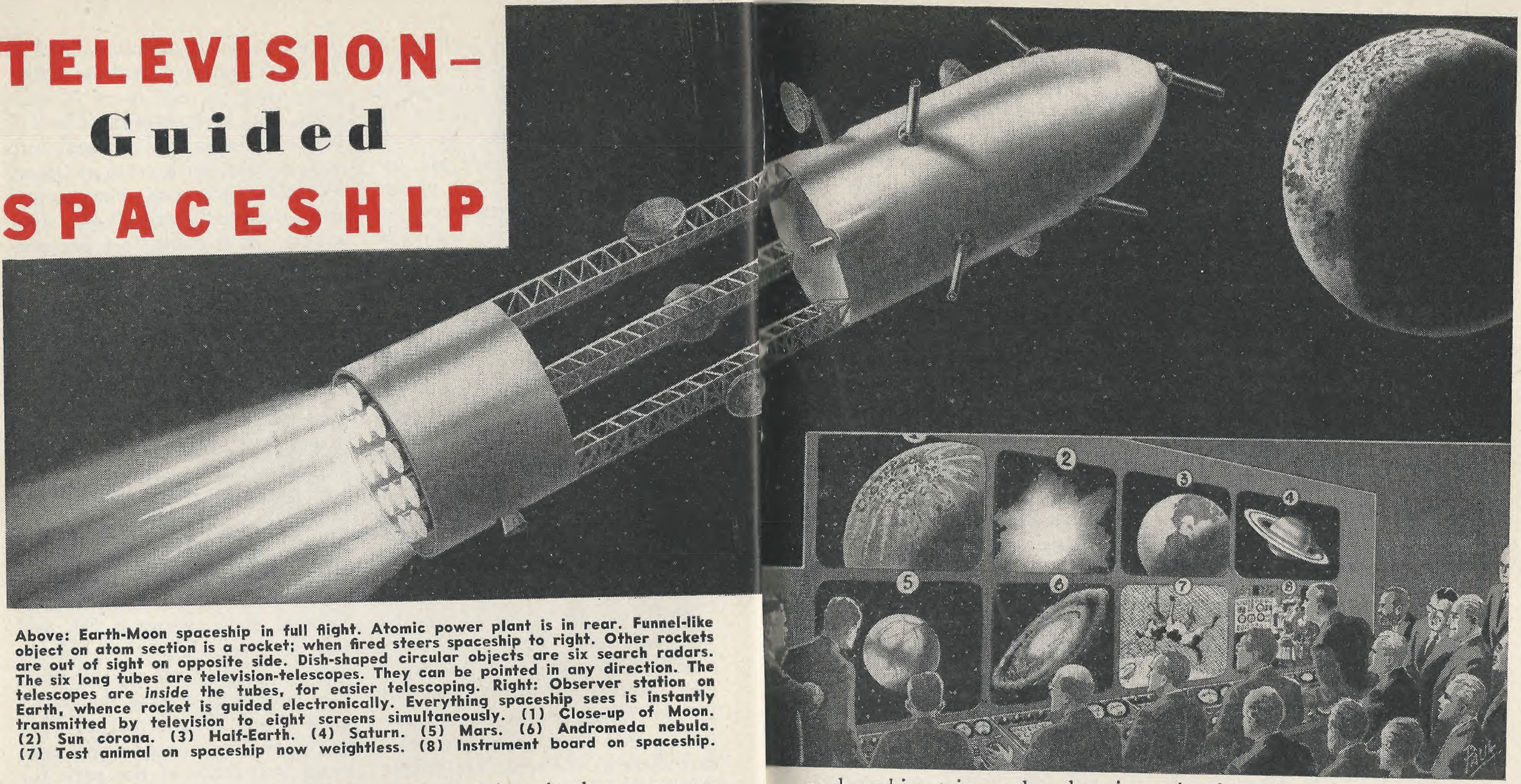
The *All-Humanity* Cube fits nicely into the southern end of Central Park, between 5th and 8th Avenues. The three blocks measure almost exactly ½ mile. The cube will occupy the park's space from 59th Street to 70th Street, leaving unused a still generous four-fifths of the park for use of the squirrels, the birds, and the insects.

The Park Department will welcome this arrangement, because we generously leave them most of the park. Besides the humans—including the genial but strict Commissioner Robert

(*Continued on page* 31)

*A number of scientists were consulted on the point which classification comes first. None could agree because at best it is pure guesswork.—H. G.

TELEVISION-Guided SPACESHIP



Above: Earth-Moon spaceship in full flight. Atomic power plant is in rear. Funnel-like object on atom section is a rocket; when fired steers spaceship to right. Other rockets are out of sight on opposite side. Dish-shaped circular objects are six search radars. The six long tubes are television-telescopes. They can be pointed in any direction. The telescopes are *inside* the tubes, for easier telescoping. Right: Observer station on Earth, whence rocket is guided electronically. Everything spaceship sees is instantly transmitted by television to eight screens simultaneously. (1) Close-up of Moon. (2) Sun corona. (3) Half-Earth. (4) Saturn. (5) Mars. (6) Andromeda nebula. (7) Test animal on spaceship now weightless. (8) Instrument board on spaceship.

IN a recent symposium, some 65 rocket experts, scientists, space experts, and others were asked their opinions as to the most likely date of the first spaceflight.

My own conjecture was the year 1970. This figure coincided with that of several other scientists.

My opinion, furthermore, was that the pioneer interplanetary flight would be an *unmanned* one. It is almost certain that humans will not be allowed to risk the first spaceflight, due to the many hazards inherent in the undertaking. However, a number of small animals will make that epoch-making trip, so that the scientists in charge of the venture may better formulate their plans for future trips with *manned* spacecraft.

Up to the present we know little or nothing about the possible behavior—and survival—of animal life during the 250-hour trip through outer space to the Moon and back.

● There are the hazards of extreme heat and cold—near absolute zero to hundreds of degrees heat — cosmic rays, ultraviolet radiation, weightlessness of animal internal organs for days,

spacesickness, ship damage from small meteorite collisions, and other unknown hazards. Much more scientific information must be gathered first in unmanned flights before we can risk the lives of human passengers.

Furthermore, even at the present state of science, it is comparatively more simple to undertake an unmanned flight than a manned one. Air-conditioning and chemical air-purifying a large space for four to six men comprises a big load in an outer spaceflyer where the saving of every pound and every cubic foot of space is critical. Humans must have water, food, cooking range, bunks—all weighty, all space-consuming. Such weight and space is needed more to go into instrumentation for compiling data to make future flights possible for humans.

● More important—and far better than human observers on that first pioneering trip—are a number of instruments that are never off the job for eating and sleeping. These devices don't get ill, but will accurately observe every detail around the clock and will radio the information to Earth every second during the comparatively long trip. These instruments hear, see, and feel incessantly.

They enable the scientists and engineers to correctly evaluate the flight and keep the spaceship on a predetermined exact course. As far as the observing scientists and technicians on Earth are concerned—and for all practical purposes—they are making the trip in person.

● A manless outerspace trip *could* be made *without television equipment,* but it would be pointless and of little scientific value. It would be like sending blind men on an expedition to the top of Mount Everest. With television as advanced as it is today—and with color television now assured—the continuous visual link in unmanned flight has tremendous possibilities. Manless flights in television-guided planes are no longer a novelty. Numerous such flights have been made since the closing years of World War II.

This idea originated with your writer and was fully described in a technical article long before the advent of television. The article, illustrated, was entitled "The Radio-Controlled Television Plane," and it was published in the November 1924 issue of THE EXPERIMENTER. This particular projected airplane was a warplane that could look simultaneously in six directions — north, south, east, west, up, and down —something no human can do. The plane could fly beyond the horizon and release bombs over selected targets, visible to the distant ground observer.

The future Earth-to-Moon spaceship will be guided successfully on its course in the same way. To do so will require certain elaborate installations on Earth. Let us assume our atomic-powered ship has been launched on its Moonward trip. From the moment it has left its launching site, it will be in constant, uninterrupted communication with the Earth. Due to the Earth's rotation on its axis, and the Moon's rotation around the Earth, we must have from 4 to 6 observation points at widely separated stations on the Earth, located somewhere near the equator. Thus, by means of radar, we can track the spaceship continuously during its entire course except for a few short hours when it circumnavigates the Moon.* All the observation points around the Earth are linked together by short waves, thus operating as a single unit. There will be one central point which co-ordinates all the far-flung units.

● In the spaceship we have several transmitters, radio as well as television. All are powered by the main atomic generator. Automatic machines constantly send Earthward all sorts of special signals for interpretation by the mundane observer staff. These are: temperature inside and outside the ship, cosmic ray and ultraviolet intensity inside and outside the ship, atomic power generation in plant, and many others. Besides these, a number of microphones through which any noises are transmitted to the Earth-listener-observers are located in various strategic points all over the ship. The likely bombardment of sandgrain-size meteorites as they impinge on the ship's outer hull will be clearly heard on Earth. It will sound like hail on a tin roof. While not dangerous to the onrushing ship, the scientists must know how dense such meteorite showers are and how often they occur.

● The danger of big meteorites, in my opinion, is negligible, if we take the correct safety precautious. By means of continuous search radar, as I have pointed out in a former article,* these

*Because of the intense interest of all scientists to view the other side of the moon—perpetually invisible to us on Earth—we might arrange to send a relay accompanying rocket with the spaceship. This relay would be visible from Earth while the spaceship was behind the Moon. Thus we could see the reverse side of the Moon via television. This suggestion was made to me by Professor Donald H. Menzel of Harvard Observatory.

*See article "Radar Possibilities," RADIO-CRAFT magazine, May 1945.

meteorites can be located while still hundreds of miles distant. The search radars, coupled to an electronic machine, change the course of the ship automatically in an instant, thereby averting the high-velocity missile.

● The test animals can be seen and heard at all times by the distant observers. Special microphones and a television camera transmit all sounds and sight while we look in and watch the behavior of the animals, when they are weightless. Confined, each in a roomy wire cage, so they cannot injure themselves by hard collisions, we will gain much valuable information how animal life can endure the long-drawn-out siege of weightlessness. Automatic devices provide food for the animals several times a day, while special moving trays under the wire cages dispose of waste matter, thus keeping the quarters sanitary.

While all this takes place, a more or less constant stream of electronic signals is flashed from the Earth observation points to the ship in flight. If the ship is off course, this condition can be instantly corrected by electronic telemachines on board. If the ship speeds too fast or is too slow, the atomic rockets can be so adjusted that the ship runs its course on the exact schedule desired. The various television cameras can be pointed into new directions, or refocused in seconds by remote control from Earth.

There will be seven or more television cameras on board. Six of these, with wide-angle lenses would cover pretty much the entire sphere. In space, however, we do not make use of the usual points of reference. There is no "up" or "down." We do not even have a "north, south, east, or west." The reference system will be either that of the ship itself or the stars in the sky.

These television cameras will be supplemented by others whose lens system is more powerful, giving the effect of a television telescope. In this way we shall see clearly the depth of lunar craters even when we are at a considerable distance from the moon. Similar powerful television telescopes will record the sun and planets.

● As soon as the rocket ship has cleared the earth's atmosphere, various powerful telescopes will be exposed directly to outer space. These will presumably be reflecting telescopes, for the most part, which will not absorb the ultraviolet rays that do not penetrate our atmosphere. These rays, coming to us from the sun, stars, and planets will convey important secrets of the chemical and physical nature of the various heavenly bodies. The spectroscope—a television spectroscope—designed to record the extreme ultraviolet will relay this information to eager astronomers waiting at the television screen.*

● The six-direction television cameras will now relay whatever they observe during the entire trip and transmit the result Earthward via v.h.f. (very high frequency) short waves. The Moonward camera will be constantly pointed to the Moon and we will thus see how the size of the Moon steadily grows larger. The Earth-pointing camera shows our planet as it spins on its axis and shrinks visibly from hour to hour. We may also see the extraordinary spectacle—never seen by human eyes—a first-quarter, or last-quarter crescent-Earth, or a half-Earth. (Seen in different positions from various points in free space, the Earth shows the same phases as the Moon.) The camera pointing Sunward will give us the most spectacular view of all—the Sun in all its fantastic glory, no longer hampered by the terrestrial thick blanket of air which robs us of a clear view. Now we will see the awesome solar streaming corona, the million-miles-long streamers and the mysterious solar prominences.

Other TV cameras will give us fine views of several of the other planets, certain of our closer stars, a much better sight of the Milky Way, various galaxies, and other heavenly objects. *We need only a single television transmitter* for the many TV cameras. By means of an electronic switching arrangement, each camera is switched on for only a fraction of a second. This switching can be done so rapidly that we require only a single transmitting channel. Yet on the distant Earth screens, different views are thrown on six or eight (or more) TV screens, *simultaneously*. The result is then watched by a number of observer-scientists. At the same time, a permanent record is made on a magnetic tape, so that the television recordings may be studied later at leisure.

Several times a day the country's television networks can be connected into the observation circuits, making it possible for the entire population to watch the pioneer spaceflight, as it takes place, in all the various aspects.

● A word about atom power:—The illustration shows the atom-power plant sufficiently far removed from the body of the ship

*Professor Donald H. Menzel, acting director of Harvard College Observatory, who kindly read the proofs of this article, graciously supplied the interesting information contained in the above paragraph.

so that dangerous or too powerful destructive radiation will not affect either the test animals or instrumentation.

I am quite sanguine, however, that by the time the first atom-spaceship is built, the present bothersome radiation problem will have been solved. By that time the dangerous radiation will have been either neutralized *or more likely put to work giving more useful power*. Radiation in reality is energy, or power. So why not use it instead of wasting it in useless shielding?

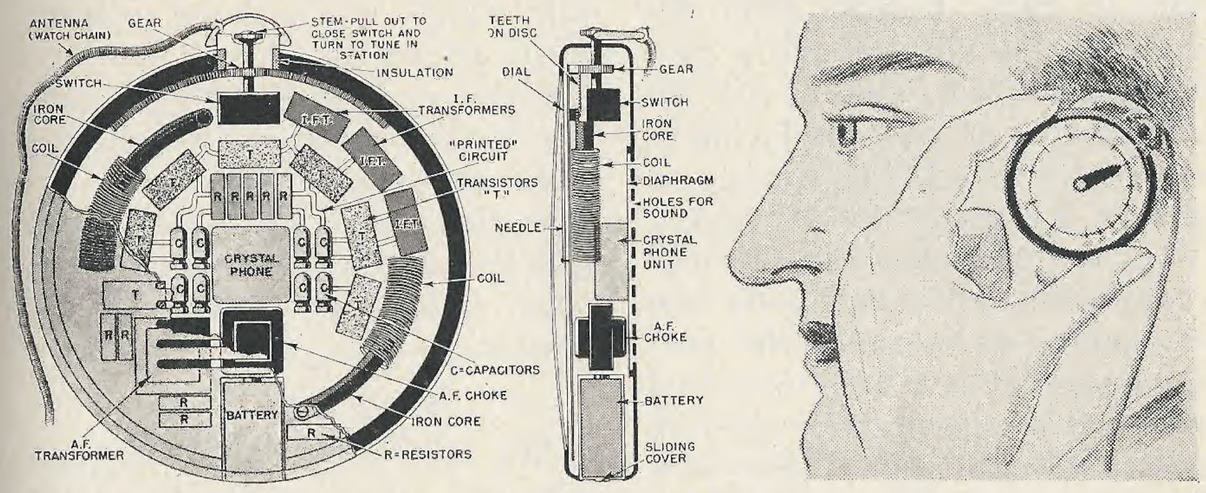
● For a number of technical reasons we do not land our spaceship on the Moon. We can get within a reasonably close distance of our satellite, sufficiently close to get excellent television views in abundance. In circumnavigating the Moon, we follow a figure-eight course. This takes us around the rear side of the Moon, which has never been viewed by human eyes. As the spacecraft gravitates around our satellite, the ship will be out of communication with the Earth for a short time—unless we use an accompanying relay rocket, as already mentioned before—because radio waves cannot pass through the Moon or around it. As the ship obeys the laws of motion of all celestial bodies, we need not be concerned about the short time it will be out of our view. Indeed, it requires no power on its circumnavigation of the Moon—the rockets having been shut off long before the ship approached the Moon. It now gravitates *free,* as do all celestial bodies.

● The entire round trip takes approximately 250 hours, or about 10 days. It could be done in less time if more power were expended, but at this stage of development, nothing would be gained, at least from the science point of view.

The landing operation is effected in the classic, rocket-retardation manner. The ship in this case must be turned around completely some minutes before landing. Now the rockets are pointed Earthward and fired, giving rise to powerful braking action. Thus the ship can land without much danger, always provided the landing is made reasonably close to an observer point, enabling the ground technicians to directly watch and electronically control the landing operation closely.

The knowledge gained from this historic pioneering voyage will then open the way for the rapid *human* conquest of space.

RADIO WATCH



Radio watch which will be on market in near future. Size about 2″ in diameter, ½″ thick. Dial of watch is calibrated for all broadcast stations. You tune by pulling out watch stem and rotating it. You listen to radio by putting it against ear. Perforations on other side of watch allow sounds from speaker to reach ear.

DURING the next few years *miniradios*—as I term them—will make their appearance all over the world.* Millions of them will be sold, for the reason that the miniature portable radio, small enough to slip into the coat pocket, vest pocket, or a lady's purse, is in high demand today. In the home during power failure, in the theater, in the movies, in camp, in a boat, or on a walk, the new personalized miniradio will give weather forecasts, the news, or entertainment. The upkeep will be absurdly low, for its single dry-cell battery, obtainable anywhere, costs but 15c.

*See my editorial on this subject, September 1944 RADIO-CRAFT and November 1953 RADIO-ELECTRONICS.

● While I predicted the watch-size radio as long ago as 1944,** it was then not possible to actually build one, for the simple reason that up to very recently the radio components were far too large for the small space in a watch size case. But the *transistor,* that marvelous new electronic microwonder, the size of a match-head, now replaces the cumbersome vacuum tubes. It requires so little electric current that a tiny dry cell, the size of a large button, will power the small radio receiver.

The radio watch here described can no longer be called visionary.

**See TAME, my 1945 Christmas booklet, *The Perpetual Radioview Watch.* This was a wristwatch-size radio with television.

It can be built today, with electronic components available NOW.

It will probably not be available in 1954, because after designing and engineering a new electronic device, there is still the undertaking of mass-producing it, so it can be sold at a price to attract a multitude of buyers. The tools and dies for the new radio watch will take a good deal of time to build, after the final hand samples have been made and when all the inevitable bugs such as are encountered in any new device have been ironed out. Nimble-fingered workers must be trained, too, since ordinary radio assemblers cannot cope with such tiny components as are used in this miniradio.

But there is nothing to prevent clever radio technicians from hand building a watch-case radio today. Indeed, I am quite certain that a sample as here described will be constructed successfully in 1954.

● The watch-case radio shown in these pages was originated by me in its various details. The engineering, assembly, and other technical data were worked out by Harry W. Secor and technical members of the staff of RADIO-ELECTRONICS magazine.

The present—let us call it the 1954 model — radio watch was patterned after an Elgin pocket watch. This is an average watch that measures 2 inches across and is ½ inch thick. It is not a very thin watch, nor is it the smallest man's pocket watch you can buy. The larger type was chosen simply to accommodate present-day radio components. It is quite certain that in a few years much smaller and fancier and more elegant watch-case radios will be available.

How It Works

We will need a small antenna with the new models. The later models—when the art has sufficiently improved—will no longer require them. For the 1954 model, I simply use a special watch chain made in such a manner that all links of the chain contact each other positively. There is no problem in making such a chain—it even can be made in a single piece of wire—a spiral—to form an inductance. The antenna need not be longer than one foot.

To switch on the watch radio, you merely pull the stem. *Instantly* the radio gives forth music or the spoken word. By turning the stem, you select all the different radio stations on the air. On the front of the watch case is the radio dial, calibrated from 550 to 1700. Thus you tune your watch-case radio as you would tune any other radio. There is one improved wrinkle here—the numbers on the dial are luminous —so you can tune them easily in the dark. The watch stem works with some friction so that if you accidentally touch the stem while listening, you do not tune in an unwanted station.

● To turn off the radio, you merely push down the watch stem. To listen to it, turn it on, then place it against your ear. The back of the case has a grille or holes through which the sound issues.

In this particular model, I did not think it necessary to provide a volume control. Miniradios are not designed for earsplitting volume. If the sound should be too loud, as might be the case from a nearby station, one simply detunes a bit by slightly revolving the watch stem — or merely by moving the radio somewhat away from the ear. Each method is satisfactory, depending upon circumstances.

One important consideration in the watch radio is that for the present its case must be built from plastic or other nonmetallic material. A metal case or housing would give rise to detrimental body capacitance effects. Other present small, so-called pocket sets —better called overcoat pocket sets—are built with plastic housings for the same reason.

At the bottom of the watch-case radio there is a small sliding cover. Slide it back and out pops the tiny battery; with average daily use a replacement battery is needed but once a month or less often.

Technical Details

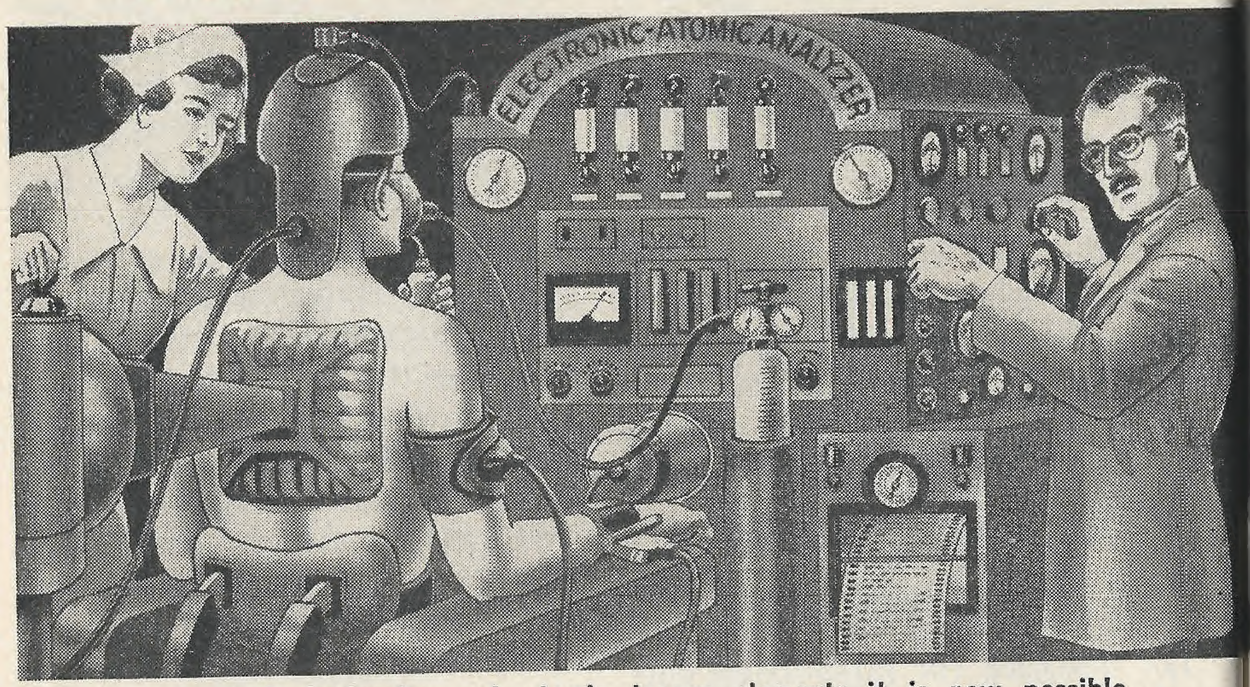
The circuit is a more or less standard 7-transistor-powered superheterodyne. Instead of a tuning capacitor, we use the more modern twin iron-core tuning inductors. Both are worked in unison by gears as shown in the detail sketch. All the other components shown are standard today and are available from radio-electronic supply houses. This is true for all the miniature items: transistors, capacitors, i.f. transformers, a.f. chokes, a.f. transformers, and crystal speaker.

Many of these components are made to plug in. Thus, printed or appliquéd electronic circuits can be used, obviating a more bulky chassis and many laborious soldered connections.

"Single Station" Watch-Case Radios

● Simpler to make than the described model would be a single-station type. Such a radio would need no tuning dial, as it would be set for only one frequency. However, such limitation would restrict popular demand for this type.

what is YOUR TRUE Sex?



By means of electronics and atomic tracer elements it is now possible to completely analyze humans, particularly for glandular information. This gives doctors a true index for masculinity and muliebrity—sexual index.

BIOLOGISTS, sexological scientists, and researchers increasingly have come to the conclusion that there is no such individual as a 100% male or a 100% female.

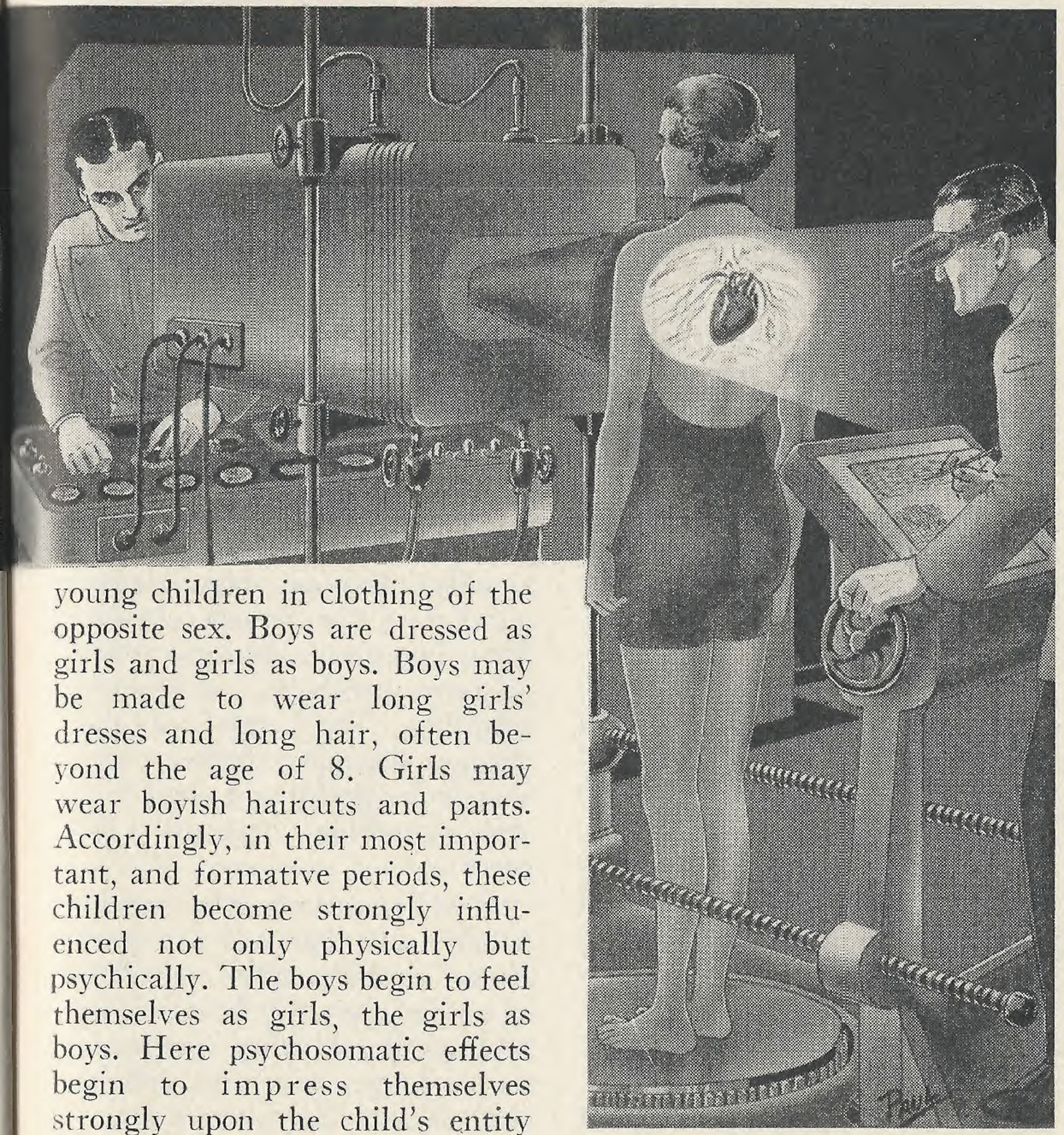
There is a scant amount of literature on this subject. Even Kinsey, in his two published volumes, has little to say on the varying degrees of *masculinity* and *muliebrity.**

The subject of comparative sexual disparity in males and females is, of course, an ancient one, but knowledge of the reason and causative factors for the status are comparatively new.

Many scientists today incline toward constitutional, including genetic, chromosomal, and endocrinological factors, but these alone do not account for all the involved facts. Psychological factors, environment, the child's early training, and other considerations also play a large rôle.

● Let us take an apropos example. Many parents dress their young children in clothing of the opposite sex. Boys are dressed as girls and girls as boys. Boys may be made to wear long girls' dresses and long hair, often beyond the age of 8. Girls may wear boyish haircuts and pants. Accordingly, in their most important, and formative periods, these children become strongly influenced not only physically but psychically. The boys begin to feel themselves as girls, the girls as boys. Here psychosomatic effects begin to impress themselves strongly upon the child's entity and it becomes almost impossible to throw off the early inculcation in later life.

Indeed, in a large majority of



In the future, using a special cold-light generator, more intense than sunlight, we can transilluminate the human body. Physicians, by special focussing, can then view all the interior organs.

*The term *muliebrity* instead of *femininity* is here used for its sexological connotation. In anatomy, *muliebria* means the female genitalia. Muliebrity means womanhood, also the state of being a woman, or of possessing full womanly powers—correlative of virility. (From Webster's New International Dictionary.)

these cases, such children growing into adulthood become what I have termed *conditioned transvestites*. We sexologists, who have seen literally thousands of letters from transvestites and have talked with dozens of them, have been deeply impressed with the fact that so many of the cases were *transdressed* in their childhood.

To correct an almost universal erroneous view, transvestites are *rarely homosexual*. But a man may feel a compulsion to dress up in female finery, complete with nylons and high-heel shoes. He must satisfy this urge or life will become intolerable. Satisfying such urge usually brings vicarious sexual relief. However, aside from this minor deviation—transvestites can be excellent husbands (or wives), provided their mates can learn to tolerate and live with this eccentricity. A high percentage won't.

What are the important and outstanding characteristics of masculinity and muliebrity? To put it bluntly:

● *A male is as male as the prevailing state of his testes; a female as feminine as the prevailing state of her ovaries.* This statement is by no means all-inclusive of all the facts; it is at best an approximation, but it may stand until further research is forthcoming.

To illustrate the above *quasi* axiom, let us look at an eunuch —a castrated male. He is at best only a 40% male. Having no testes, he generates only very little of the all-important male hormone, *testosterone,* as well as little of some other hormones. If he was castrated as a child, his lower leg extremities have grown disproportionately long. He usually has a high, feminine voice. He walks with a feminine gait, and his body has little, if any, hair. Moreover, he may think like a woman. His body may become rounded like a woman's and he usually takes on fatty deposits paralleling the female physique. Most important, the total absence of testes precludes his begetting offspring. The degree of these changes depends whether castration was performed before or after reaching maturity (puberty).

Now let us look at a castrated female, who lost her ovaries by disease or by surgery, or who—in a rare case—was born without any ovaries. Having no ovaries, she no longer generates sufficient vital female hormone, *estrogen,* and perhaps some other hormones. Such a woman—depending on her age—may acquire a male-like, low voice. She usually will grow

hair on her body, particularly on the legs, chest, and face. She cannot menstruate. Her skin may lose its female softness and her gait may become more masculine. The total absence of ovaries physically, types her as a woman past her menopause, regardless of her age. This also means total barrenness—she no longer can procreate. She is now a 40%—or less—woman.

● By way of correcting another fallacy, neither *adult* eunuchs nor castrated women lose their libido, if they were castrated *after* puberty. If married, depending on their age—both can carry on satisfactory marital relations. If castrated in early infancy, they may never acquire libido.

We have above considered extreme cases — castrated individuals, either 40% male or 40% female—or less. Now let us consider the run of the mill—the so-called "normal" individuals. We may find at the top, perhaps 90% males or 90% females. The percentages given here are wholly arbitrary—so far science has no accurate yardstick and it may be many years before we have exact scientific data.

However, we do know for certain why there is not likely to be a 100% individual of either sex. The reason: Both males and females—all animals for that matter, with perhaps few exceptions —have in their bodies both male and female hormones. The average male thus generates not only testosterone but estrogen as well. So does every female. *But* the amount of estrogen in the male is comparatively small. Likewise in the average female there is produced only a small percentage of testosterone.

● Now if the male and female hormones are carefully measured and reduced to percentages, why won't we have a good yardstick to calculate the masculinity and/or the muliebrity of everybody?

The problem is far more complex. There are the chromosomes which determine sex originally—XX chromosomes in women, XY in men. Furthermore, as we have hinted above, there are a number of other hormones, besides the primarily male and female ones. And new ones are discovered every year. Many of these hormones play a significant rôle in our physical makeup, and, in conjunction with the male and female hormones, make us the individuals that we are.

The chemistry of the animal body is highly involved and depends on scores of factors, such as evolution, heredity, alimentation (i.e., the foods and liquids we ingest), the metabolism caused

by the foregoing, light, heat and surroundings, as well as others lesser known.

In addition, there are a number of psychic factors, as we have already seen, all of these contributing to the sum total of our final sexological makeup.

We can therefore readily understand that there must be thousands of varied degrees of masculinity and muliebrity between the castrate 40% and the top 90% "normal" individual.

● *People have a right to know their true sex status.* Their peace of mind, their happiness are involved in it. Untold millions of neurotic individuals can trace their difficulties to sex disparity in their makeup. Conversely, once we know how to grade individuals as to their true sex, *we will be able to remedy the existing individual deviations from normal.*

Electronics coupled with atomics will most likely bring the solution. Electronic circuits have already been devised whereby many parts of the human anatomy may be explored successfully without operations.

More important, electronics gives us many tools to explore and accurately grade all of our glands, hormone-producing and otherwise. Thus accurate indices as to their all important rates of secretion can be had.

Atomic tracer elements coupled with electronic devices even now are unraveling many hitherto unknown or little understood facts of our internal anatomy. This new science, electronic-medicine, is making spectacular strides.

In due time, too, I foresee entirely new techniques to explore the deepest innermost recesses in our bodies. The X-ray was the first tool to *indirectly* view the inside of our bodies.

In the future, the medical technician will *actually* see all of your interior organs and will watch them work.

● This will be done by means of a device placed directly against your body. It will be a light source, several times as powerful as the sun—but it will be *cold light.* The light source will be so strong that it will transilluminate the thickest part of the body. Thus the physician by accurate focusing can actually see *in three dimensions* your heart as it beats. He can also see the heart's interior and watch the working of the heart valves. He will watch the actual working of many of your glands, either with his own eyes, by photography, or by motion pictures.

When that time comes, *and it is coming,* we will at long last know what makes us tick.

VANITY IN HUMANITY

(*Continued from page* 15)

Moses, along with all the Park employees, will no longer need the park—they will be safely ensconced in the Humanity Cube for the moment!

For a better visualization of the cube, we already know that it stretches for three between-the-avenue blocks (extra-long in New York)—to be exact ½ mile, or 2,640 feet.

● How high does the ½-mile-cube soar? Not high, for instance, as airplanes fly. Let us take the Empire State Building, which, with its television tower, rises to 1,472 feet above street level. Then put on top of it the second tallest skyscraper in America, the Chrysler Building. It is 1,046 feet high. On top of this we place the Statue of Liberty, 151 feet high from base to torch (height of pedestal omitted). Thus the three structures together rise to 2,669 feet—only 29 feet beyond the ½-mile mark.

● Now if we wished to be downright cynical, we could easily bring together the All-Humanity Cube and the human race's greatest intellectual achievement since the dawn of man — the atomic bomb! Dropped on the Cube by means of an electronically guided missile, that single bomb could easily wipe out the entire population of the world in a fraction of a second. But rather than have Moscow call us warmongers or worse, we can simply open the Cube's gates and disperse the folks to the seven corners of the Earth.

The Cube can then be used strictly for peace purposes by the U.N. to exhibit wares and handicrafts from all the peoples of the World. The Kremlin now will call us *peacewrongers!* To which we reply—*Nyets* to them!

ATOMIC DEFENSE

(*Continued from page* 7)

launching an A-bomb-carrying plane, it will then be up to our Air Force to bring it down, always provided that our search radar instrumentation network detects the enemy plane in time.

TROPHY testifying to "50 years of devoted effort and contribution to the Radio-Electronic art and to scientific prognostication 1903-1953" was presented to Hugo Gernsback, publisher of RADIO-ELECTRONICS and other publications, at the RADIO INDUSTRY BANQUET of the 1953 Electronic Parts Show in Chicago, on May 18th, 1953.

The 27" x 16" silver and Lucite trophy was planned by the committee headed by: Leon L. Adelman, Maurice Coyne, Robert Hertzberg, and Austin C. Lescarboura. It was sculptured by Enzo Yocca.

A large section of the Radio-Electronic Industry, comprising 33 firms and 97 individuals, sponsored the elaborate trophy.